Do Board Gender Quotas Matter?

Selection, Performance and Stock Market Effects[*]

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Abstract

From business to politics and academia, the economic effects of gender quotas are under scrutiny. We provide new causal evidence based on the introduction of mandatory gender quotas for boards of directors of Italian listed companies. Exploiting staggered board elections, we find that quotas are associated with a new selection of board members – characterized by higher education and lower age – and no significant costs, neither on firm performance nor on the stock market.

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1 Introduction

Women are underrepresented among top leadership positions. The *glass ceiling* – the invisible barriers which prevent women from reaching upper-level positions – is still a dominant phenomenon. Even in countries in which women participate more in the labor market, only a minority makes it to the highest positions. According to the World Economic Forum (2020), only 58% of the gender gap in economic opportunities has been closed around the world. At the slow speed experienced over the period 2006-2020, it will take another 260 years to vanish completely.

Gender quotas have been proposed to accelerate the process towards economic gender equality and to promote women's empowerment.[1] Norway pioneered the introduction of gender quotas for boards of directors in 2005. Italy, France, and Germany, among others, followed. Three European Directives on gender quotas have been proposed and are currently under consideration, while the debate is open in many other countries. In September 2018, California was the first US state to approve a bill for the inclusion of women on the boards of directors of public companies. The approval of the bill came after a harsh debate between promoters and opponents. In fact, gender quotas are controversial. They have been widely advocated for achieving a gender-balanced representation in top positions, a crucial goal for achieving economic gender equality (see OECD, 2012; IMF, 2014). Yet, opponents argue that they violate meritocracy, with costly consequences. By equalizing outcomes rather than opportunities, quotas come with the risk of promoting less-qualified individuals, who are likely to perform poorly (Holzer an Neumark, 2000). For instance, if highly qualified women cannot be found, board gender quotas may produce negative effects on the performance of companies and negative stock market reactions. Are these negative consequences the unavoidable cost of achieving more gender-balanced representation?

What we know so far about the effects of board gender quotas on the economy is based on the Norwegian experience. In late 2003, a law was approved in Norway mandating at least 40% representation of each gender on the board of companies listed on its stock market (existing firms had to comply by January 2008, while new firms by January 2006). The Norwegian law imposed a

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[1]In parallel, gender quotas have been introduced to reduce political gender gaps, the other crucial dimension of gender inequalities (see Section 2 for more references).

dramatic and rapid transformation of the composition of boards of directors (Engelstad and Teigen, 2012; Huse and Seierstad, 2013). Research has shown that the Norwegian law has been effective at increasing the number of women at the very top of the earnings distribution, but it has not been able to reduce gender gaps overall (Bertrand et al., 2019). Matsa and Miller (2013) found a decrease in operating profitability of firms after quotas. An early study by Ahern and Dittmar (2012) shows that the increase in the number of women on boards in Norway imposed a significant cost on firm value and stock market returns. However, new evidence supports the non-significant result. Eckbo et al. (2021) discuss the validity of the result in Ahern and Dittmar (2012) and show that, by using a more robust specification, the negative market reaction in Norway becomes insignificant and the negative effect on operating profitability is only a short-term effect related to the financial crisis. Yet, Norway is a very peculiar case, being a top performer country in gender statistics worldwide. In a different context, the soft quota introduced in Spain has been analyzed (de Cabo et al., 2019): the voluntary approach adopted by Spain with an economic incentive to comply (compliant firms may receive a preference for the tendering of public contracts) but without sanctions to firms not in compliance with the recommended target, did not reach the goal of promoting gender-balanced boards. Thus, the analysis of a different case is needed to assess the effects of board gender quotas outside Norway and in a general perspective.

This paper provides new evidence based on the introduction in July 2011 of board gender quotas in Italian listed companies. The so-called "Golfo-Mosca" (by the names of the two proposers) law mandates gender-balanced representation on the board of directors and statutory auditors of publicly listed companies. Unlike in Norway, in Italy quotas are temporary, and the measure will be in place only for three consecutive board elections. The required target of representation of either gender is set for all companies subject to the law (independently on the size of the board) at 1/5 for the first election after August 2012, to be increased to 1/3 for the following two board elections. In December 2019 the law is extended for additional three elections with an increase of the quota up to 40%. In our analysis, we focus on the first target and thus on the short-term effects of quotas.

The Italian case is a unique and innovative opportunity to assess the economic effects of board gender quotas. On the methodological side, we can exploit staggered board elections: the quota

law does not apply to all firms at the same time, as in Italy board elections are held every three years on a date decided by each firm, and the year of board election depends on the past.[2] More generally, Italy features a very conservative gender culture, and ranks poorly in Europe in almost all gender statistics (see Profeta et al., 2014): in the last ten years, women's participation in the labor force has remained stable at around 47%, the lowest value in Europe, if we exclude Malta. In this context, the quota policy was perceived as the only possible way to start the process towards gender equality. But at which cost? A country with no economic growth certainly cannot afford to bear substantial economic costs. In this paper we find no evidence of significant costs, neither for firms' performance nor for stock market returns, associated with the introduction of board gender quotas in Italy.

We focus on the short-term impact of the board gender quota law and consider the period 2007-2014. To perform our analysis, we manually collected individual data on all members of the boards of Italian listed companies in the period 2007-2014 (4,732 unique individuals), as well as firm-level data on relevant outcomes of these companies (243 companies) and stock-market prices. With these data, we are able to address three fundamental questions that allow us to evaluate the effectiveness of quotas in the process of promoting women's empowerment *vis-à-vis* their possible costs: Do the composition of the boards and the characteristics of board members change after the introduction of quotas? Do firms' outcomes, such as economic performance and variability of stock prices, change after the introduction of gender quotas? How does the stock market react to the approval and implementation of board gender quotas?

Our results can be summarized as follows. First, we exploit the staggered compliance of Italian firms with the gender quota law to study how the boards change following the appointment of women directors. We consider several characteristics of board members, such as gender, age, and education. We find that, when gender quotas are enforced, firms show a higher share of women directors (well above the required threshold), higher average education levels of all members of the board, and fewer older members than before the quota. Our results suggest that gender quotas

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[2]Given the staggered board elections across Italian firms, we can use the reform period as an instrument, rather than being forced to rely on the pre-quota percentage of female directors interacted with year dummies – which may raise endogeneity concerns – to make the instrument vary across firms, as in Ahern and Dittmar (2012) and Bertrand et al. (2019)

change the selection process of the entire board. Despite having to select more women, we do not find an increase in female board members belonging to the firm owner's family, nor a clear increase in the average number of positions held by each woman.

Second, to address endogeneity and move closer to the causal effect of gender quotas on firm performance, we use the reform period – a measure exogenous to firms' decisions – as an instrument for the share of female directors. We only focus on the short-term effects of the introduction of gender quotas. Our results show that quotas are not associated with significant effects on firm performance as measured by number of employees, assets, production, profits, ROA, Tobin's Q, and debts. When looking at stock market performance, we show that the presence of female directors reduces the variability of stock prices – a crucial dimension of performance for listed companies, not explored before in connection with board gender quotas.

Third, we run an event study at the date of the approval of the law and show that there is no significant difference in returns between more gender-diverse and less gender-diverse Italian firms. We also perform an event study at the date of board election, which happens on a different day for each firm. By comparing the returns of companies with a smaller share of women in the pre-reform board composition (i.e., farther from the quota target) and companies that were closer to the target, we exclude that the introduction of quotas is associated with a costly reduction of stock market returns. If anything, investors positively reacted to the appointment of women on boards in elections that happened after the approval of the quota law.

The paper is organized as follows. The next section reviews the related literature and Section 3 describes the Italian law. Section 4 presents the data that we will use throughout the different analyses performed in the paper. The three sections that follow present analyses related to our three fundamental questions: the impact of the law on board characteristics, the impact of the law on firm performance and the variability of stock prices, and the impact of the announcement of the quota law and the appointment of female directors on stock market prices. Each of these sections presents first the empirical methodology adopted and then the results. Conclusions are in Section 8. Additional evidence is provided in the Appendix.

2 Related literature

Board gender quotas have been previously analyzed with reference to Norway. Several studies assess whether the increased female representation in top positions due to the Norwegian quota had any impact on firm economic performance. Matsa and Miller (2013) find that firms affected by the quota law fired fewer workers, thus causing an increase in relative labor costs and employment levels and reducing short-term profits. Ahern and Dittmar (2012) show that gender quotas caused negative market reactions, due to the appointment of young and less-expert members. However, Nygaard (2011) shows that this effect depends on asymmetric information between independent members of the boards and the managers (see also Ferreira, 2015). Moreover, Eckbo et al. (2021) show that, once a more robust methodology is used, the negative result found by Ahern and Dittmar (2012) vanishes.

On cultural grounds, Italy is very far from Norway and closer to Spain, which represents an interesting comparison country to our study. Spain, however, followed a different way and introduced a soft quota, which, by being a simple recommendation without sanctions, was not able to produce a substantial increase in the share of women on boards (de Cabo et al., 2019).

More generally, our paper relates to the large literature on the effects of gender quotas, a controversial policy (see Profeta et al., 2014, Pande and Ford, 2011 for reviews). The main argument in favor of the adoption of gender quotas is their effectiveness as a means to equalize opportunities in specific areas where women face systematic barriers due to discrimination or persistent stereotypes (Holzer and Neumark, 2000). These policies may lead to a redistribution of jobs, positions, contracts, or parliament seats in favor of women, and thus allow for a fair distribution of rewards of good jobs. Moreover, if women who benefit from affirmative action are largely qualified to successfully perform the tasks they are appointed to, the benefits do not remain within the group of women but spread to the entire economy (Hsieh et al., 2019). If women accumulate more human capital that raises their productivity, these policies may even increase efficiency (Conde Ruiz et al., 2015). Quotas are an instrument (often considered the only one) to break down the masculine monopolistic power, which obviously does not lead to an equal outcome, but probably neither to an efficient one. Critics of affirmative actions, instead, share the view that the underrepresentation of

women is not due to discrimination, but is merely the result of women's choices, especially related to fertility and motherhood.[3] Thus, by equalizing outcomes rather than opportunities, affirmative actions may lead to the promotion of less-qualified individuals. Not only there may be the risk of decreasing average quality if there are not enough women with the appropriate qualifications to be appointed, but a "mismatch" may occur if women are allocated to positions in which they are unable to perform successfully. Recent studies have also doubted the effectiveness of quotas in reducing gender inequalities in specific contexts (Bagues and Esteve-Volart, 2010). Bertrand et al. (2019) found that gender quotas for listed companies in Norway improved the representation of female employees at the very top of the earnings distribution within affected firms, while they had no trickle-down effects on gender gaps.[4] In the context of academia, Bagues et al. (2017) find that the gender composition of evaluation committees does not necessarily increase the chances for women to be promoted, thus limiting the effectiveness and desirability of gender quotas. In politics, recent studies have shown that gender quotas are not at odds with meritocracy, as they help increase the quality of representatives. In the Italian political context, gender quotas have been associated with better-quality politicians (Baltrunaite et al., 2014), measured by their level of education. In the Swedish case, the "zipper" quota requiring alternating a male and a female candidate on the party's list of candidates has increased both female representation and the competence of male politicians (Besley et al., 2013). No previous study has established a similar relationship in the business context.

A sizable literature has analyzed the relationship between female leadership and firm performance outside the context of gender quotas. It would be impossible to summarize all these studies. We emphasize two main aspects: first, it is difficult to overcome endogeneity concerns without exploiting the introduction of quotas, although some of the existing studies use instrumental variables. Second, existing results are not fully conclusive. Several studies have argued that having both men and women in top positions of a company may have positive consequences on perfor-

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[3]A greater involvement of women in the economy may also have beneficial effects on cultural development. Dominant gender stereotypes and social norms have played a crucial role in generating gender gaps. Learning from other women's experience in the labor market may generate a virtuous and persistent circle of gender equality through changes to the cultural process (Fernàndez, 2013; Fernàndez et al., 2004).

[4]See also Wang and Kelan (2013).

mance. In a heterogeneous context, perspectives are enlarged, the pool of talent and qualification are diversified, and shareholders are better represented (Van der Walt and Ingley, 2003; Rose, 2007, Hoogendoorn et al., 2013). The female style of leadership, including higher levels of risk aversion (see Bertrand, 2011 for a survey), may also improve performance. These results are, however, challenged by other studies. Adams and Ferreira (2009) find a negative impact of gender diversity on performance measures such as return on assets (ROA) and Tobin's Q, while Gagliarducci and Paserman (2014) find no evidence that female leadership is related to performance outcomes. The view itself that women are more risk-averse than men is challenged by Adams and Ragunathan (2013) and Adams and Funk (2012) when female directors are considered. Other studies qualify the conditions under which a positive relationship between women's empowerment and firms' performance may arise: the existence of a critical mass of women (Schwartz-Ziv, 2017), a positive interaction among female CEOs and women on boards (Amore et al., 2014) or among female CEOs and female employees (Flabbi et al., 2019).

Non-conclusive results also emerge when looking at the relationship between women's empowerment and stock market returns. Wolfers (2010) finds no differences in stock price performance between female-headed firms and other firms. Dobbin and Jung (2011) argue that women on corporate boards are more likely to adversely affect stock prices. Ryan and Haslam (2005) find a significant increase in share price following the appointment of a female director. However, women are more likely to be appointed in times of general financial downturn, and thus have a more precarious position (the so-called "glass cliff"). How the stock market reacts to the appointment of a female director is ambiguous: Chapple and Humphrey (2011) for Australia find no reaction, Adams et al. (2012) find a positive reaction, whereas Lee and James (2007) find a negative reaction.[5] Adams and Ferreira (2003) find that firms facing more variability in their stock returns have fewer women on their boards. Though not in connection with board gender quotas, stock price volatility has been previously explored in the diversity literature (see for example Adams and Ragunathan, 2013 and Adams and Ferreira, 2003). Recently, Giannetti and Zhao (2019) find that

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[5]For Italy see also Rossi and Cebula (2015), who, for a small sample of 100 Italian listed companies during the period 2012–2014, find a positive reaction within 20 days around the date of the announcement of the composition of the board.

boards with more ancestral diversity are associated with higher stock price volatility.

Finally, our paper also speaks to the corporate governance literature, which has underlined the importance of diversity for the quality and the functioning of the board (see Dhir, 2015). An old yet unanswered question is whether the composition of the board matters for performance and firm value. Our results will suggest that quotas may be effective at increasing diversity and encouraging a better selection of board members. This is particularly important for countries such as Italy (Consob, 2015), where the pre-quota situation was characterized by the presence of women almost exclusively being appointed on boards of family firms, and by a selection process not purely meritocratic (Bianco et al., 2015).[6]

3   The Italian law

Women are largely underrepresented in the Italian labor market: in the last ten years the labor force participation rate of Italian women has been stable, around only 48%, against a European average of 60%. In 2009 the average share of women on the boards of directors of publicly listed companies was 7%, one of the lowest in Europe. Despite this context, Italy introduced board gender quotas in July 2011 (Law 120/2011).

Figure 1 clarifies the timeline of implementation of the law, which is important to our analysis. The law was first proposed in May 2009 by a member of the Chamber of Deputies, Lella Golfo, of the center-right coalition; in November 2009, the draft was re-submitted by another member of the Chamber of Deputies, Alessia Mosca, of the center-left coalition. However, it was only two years later that the draft began being discussed thoroughly by the Italian Parliament. On March 15, 2011, the draft was approved by the Senate. The final draft of the law was approved by the Italian Parliament on June 28, 2011, by an overwhelming majority. The act came into force, after publication in the Official Gazette, on August 12, 2011. We analyze news coverage of the quota law on Lexis-Nexis and find that news related to the law are concentrated around the dates of March 15, 2011 and June 28, 2011. These are the official dates of the approvals. The process of

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[6]This is also consistent with the descriptive evidence on the characteristics of board members after the quota provided by Solimene et al. (2017) for a selected sample of Italian firms.

approval of the law was not easy and before the official approval it was very unlikely to expect the law to be approved (Profeta et al., 2014). In fact, the social and political debate was very intense and strongly divided: on one side, many considered the law detrimental to the right of economic initiatives, the right of shareholders to own private property, and the principle of equality written in the Italian constitution. These criticisms were difficult to overcome and the debate was intense, both among the general public and in the Parliament. On the other side, proponents of the law built upon the raising awareness on the existence of large gender gaps in Italy and on the economic losses related to them. The awareness also increased as a reaction to severe political scandals that reinforced stereotypes on gender attitudes in Italy and clearly showed to the public opinion, both at the national and international level, that Italy was far from gender equality. However, though the issue of gender equality was clear, it seemed not obvious that board gender quotas were the appropriate way to promote it. During the law passage through the Parliament there were several dissenting voices until the very last moment of the approval, including the associations of industries and banks, who thought they could stop the process at the Senate. However the night before March 15, when the law was scheduled for approval at the Senate, senators were bombed by thousands of emails of citizens, associations, women and men advocating the approval of the law. As a compromise between stakeholders against the law and the members of the Senate, who were under a strong pressure from citizens, on March 15 at the Senate some adjustments to the original draft were included, namely the introduction of a transition period, after the approval and before the implementation of the law. Firms, which did not anticipate the approval of the law, could use this short period to adjust their behavior.

Law 120/2011, also known as the "Golfo-Mosca" law, mandates that publicly listed companies should have a minimum target of either gender on their boards of directors and statutory auditors. The quota is implemented gradually: at the first board election, the required target is 1/5 and becomes 1/3 for the following two elections. The measure is temporary and remains in place for three consecutive board elections only.[7] If a firm does not comply, CONSOB (the regulatory body of the

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[7]In December 2019 the law was extended for additional 3 elections with an increase in the quota up to 40%.

Italian stock exchange) warns the company, which has four months to comply. The warning system continues with a fine ranging from a minimum of EUR 100,000 to a maximum EUR 1,000,000. If the company persists in failing to comply without responding to the second warning within the following three months, the sanction culminates with the invalidation of the appointment of every board member. Under such an enforcement system, all companies have so far complied with the law. The law explicitly states that its effects become binding for listed firms one year after coming into force, specifically on August 12, 2012. In February 2012, the law was extended to state-owned companies, i.e. public companies under the control of the government, with immediate effect.[8]

The crucial features of the law are the following: time-limited nature, gradualism, sanctions. These features make the Italian law different from the Norwegian quota. In particular, the time-limited nature is consistent with the idea that gender quotas are a measure to "shock" and thus break the male-dominated status quo, and to lead the market to a new, more gender-balanced, equilibrium. Gradualism of the threshold (at least 1/5 of each gender at the first board election, and 1/3 at the second and third one) is based on the idea that, especially in conservative countries such as Italy, firms need some time to adapt to changes and it may be useful to set a not too ambitious first target.

Italian companies may choose among the following governance models: a one-tier governance system (*Monistico*); a dual-tier system with distinct supervisory (*Consiglio di sorveglianza*) and management (*Consiglio di gestione*) functions; or the traditional model with a decision-making board (*Consiglio di amministrazione*) and a separate board of statutory auditors (*Collegio sindacale*) with monitoring and control functions. In this last model, which is the one used by the majority of companies (96.2% of the companies listed on the main market in 2013), members of both boards are elected by shareholders. The two boards participate to the meetings deciding the strategy, main operations, and functioning of the firm. The board of directors has the decisive role on firm strategy. On average, the board of directors is made up of 10 members, and the board of auditors of 3 members (see Table 1). Boards of companies listed on the Italian stock exchange are elected every

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[8]Around 4,000 state-owned companies must comply with the gender quota law. For them, the Department of Equal Opportunities at the Presidency of Council of Ministries is in charge of the monitoring and sanctioning system. It is however unfeasible to obtain detailed information on these companies. Thus, our analysis focuses on listed companies.

three years, on a date decided by the company, which is not the same for all companies, nor on a same date in a given year.[9]

In the period 2007-2014 under consideration we can classify boards in three, almost equally distributed, cohorts: i) those changing their composition in 2007, 2010, 2013; ii) those changing in 2008, 2011, 2014; and iii) those changing in 2009 and 2012. Companies are exogenously assigned to the three cohorts: the date of renewal of the board depends on the past, well before the initial discussion of the gender quota law. In any case, we check that no firm changed the year of board election. We will highlight the division into cohorts in several parts of the analysis.

As all companies are subject to the law and boards are elected every three years, with elections typically held between April and June, the first group of companies to be subject to the law for the first time had elections in 2013, the second one in 2014, and the third one in 2015.[10] However, boards with elections in 2015 had former elections in 2012. Elections in 2012 happened in the "phase-in" period of the reform: firms could endogenously adapt to the new rules, as they were not yet required to comply by the law. Therefore, throughout the analysis we will mostly focus on the first two cohorts of firms. Figure 2 clarifies the timeline of board elections for the three cohorts of firms.

4   The Data

The list of companies to which the law applies is found on the CONSOB's website. We compare this list with the one in Aida, the Italian branch of Amadeus (Bureau van Dijk), the database of comparable financial and business information on Europe's 500,000 largest public and private companies by assets. In 2013, there were 243 publicly listed firms in Italy. For each firm, we collected the election date (month and year) of the board of directors and board of statutory auditors by accessing the corporate governance page (*Relazione di Corporate Governance*) from the company's website. When this was not available, we searched on the website of the Milan Stock Exchange (*Borsa Ital-*

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[9]For more details on how companies are regulated, see Profeta et al. (2014).

[10]There were no board elections in the period August 2012-December 2012.

iana). Alternatively, the election date was collected from the convocation notice of the shareholder meeting. Elections are typically held between April and June. For each firm, we collected from CONSOB the full names of the board members as of June 30 for every year from 2007 to 2014. Most of the time, the gender of each member was unambiguously identified through the person's first name; when the first name was ambiguous, we searched for a photo of the person.

We collected three categories of data: individual, firm-level, and stock market data. Information on the individual characteristics of board members is not available in an organized manner, and is sparse among the documents that each company must provide to CONSOB when a board member is appointed. We therefore manually collected the CVs of all members of the boards of directors and boards of statutory auditors appointed between 2007 and 2014. From our inspection of the 4,732 CVs of these individuals, we collected individual data for each member of the board.[11] We aggregate individual characteristics at the board level and construct several board-level variables: (i) the share of women on the board, whether this share exceeds the first target of the law i.e. 20% (yes or no), the distance of this share from the threshold of 20%, and the presence of female presidents and CEOs; (ii) the share of board members with a college or a graduate degree, the share of board members with a college degree from a foreign university, the fields of study (economics, law, engineering, political science, and others) (all members, and female and male separately) and the Herfindahl index of field diversity in each board; (iii) the share of board members younger than 55 (all, and female and male separately); (iv) the percentage of board members belonging to the owner's family (all, and female and male separately); (v) the average number of board positions held by each member in the same year (all, and female and male separately).[12] [13] [14] Table 1 presents summary statistics for these variables.[15]

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[11]Despite the efforts to have a complete dataset, for a limited number of boards we were not able to obtain information on all members. However, we checked that our results did not substantially change when excluding companies with more than 10% of missing values on the education variable, which was the most critical to obtain.

[12]The share of board members with a college degree represents the proportion of board members who hold a college degree of any kind, namely Bachelor's degree, Master of Arts and Master of Science, MBA, or PhD. The share of board members with a graduate degree is the proportion of members with a Master's degree, MBA, or PhD.

[13]The Herfindahl index is widely used as a measure of diversity, under the expectation that higher heterogeneity is related to better performance, see Adams et al. (2012).

[14]The average number of board positions held by each member is also analyzed in the literature on Norway. Seierstad and Opsahl (2011) show that the introduction of gender quotas in Norway is associated with an increase in multiple positions, the so called 'golden skirt' phenomenon.

[15]We consider separately boards of directors and boards of statutory auditors (and the alternative forms of governance

We then collected firm-level data on the performance of each company. This information, again, was not immediately available. We relied, when available, on data from Orbis-AIDA (Bureau van Dijk), which we integrated with data from Bankscope on banks. In case of missing values, we hand-collected the corporate documents available on the website of the Milan Stock Exchange or on the official budget balance sheets published on each company's website. We also collected firm value measured by Tobin's Q (the ratio between a physical asset's market value and its replacement value) from Datastream. Since we will consider a one-year lag in the effect of women's participation on the boards on firm performance, performance measures are collected for the period 2011-2015. The final dataset contains the following performance information for each company for the period 2011-2015: number of employees, production (the value of production of the firm in thousands of euros), profits (thousands of euros), share of short-term and long-term debts, ROA (return on assets, the standard indicator used to measure how profitable a company is relative to its total assets, i.e. how efficient a company's management is at using its assets to generate earnings), Tobin's Q and assets, (thousands of euros). The variables are measured at the end of December, when the budget is closed.

Sector data are also downloaded from Aida and harmonized to comply with the GICS classification of industrial sectors. We consider the following sectors: consumer discretionary, financial sector, industrials, and other sectors.[16] Table 2 presents summary statistics for firm performance. Note that sample sizes in Table 2 are slightly smaller than in Table 1 since some outcomes are missing for a few firms.

Finally, we downloaded from Bloomberg the daily closing stock price of all Italian publicly listed firms and stock market indices for the years 2011-2014.

To sum up, our final board-level dataset consists of 3,412 board-year observations over the years 2007-2014 including information on the gender composition of the board and aggregated characteristics of board members. Firm-level performance and financial data are collected for the

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for the very few existing cases, as explained above). Table A1 presents summary statistics using individual level data.

[16]According to the GICS classification of sectors, companies in the consumer discretionary sector include automobiles and components, consumer durables and apparel, consumer services, media, and retailing; firms in industrials include those producing capital goods and offering professional and commercial services; the financial sector includes banks and companies providing diversified financial services, insurance, and real estate. In our analysis, other sectors include energy, health care, IT, materials, telecommunication services, and utilities.

period 2011-2015.

5   Part I. How boards of directors change

We start by analyzing the effects of the gender quota law on the characteristics of members of the board. Understanding how boards change after the quota is important to evaluate the "conventional wisdom" according to which gender quotas are associated with the appointment of less-qualified individuals. Our analysis focuses on the level of education as the main characteristic that proxies members' competence.[17] This is in line with Bianco et al. (2015) for the Italian context, Adams and Ragunathan (2015) for the U.S., and corresponds with the literature on the selection of politicians (Galasso and Nannicini, 2011).[18]

5.1   Methodology

In the identification of the law effects on the composition of the board we miss an appropriate control group, since in a given election year boards of all firms are subject to the law. Therefore, we need to understand how boards would have appeared in years subject to the reform had the reform not happened. We use three different models corresponding to different assumptions on what the composition of the boards would have been in absence of the reform. The first model assumes that the composition of the boards would have been the same; the second model assumes that the composition of the boards would have changed in a linear way, and the third one assumes that the composition of the boards would have been the one observed in the boards of that year but not re-electing. For the estimation of the three models, we use data from 2007 to 2014. While the first two models include only the cross-sections of election years, the third model includes also non-election years, thus allowing us to observe in any given year the composition of boards subject

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[17]We do not consider CEO experience, not only because of the extremely low number of female directors and CEOs in listed companies before the law, but also because having more women in top leadership positions, and thus giving them the opportunity to acquire experience, is exactly the goal of the law. Indicators based on the evaluation of the directors' occupation (rather than of the education level) are also difficult to apply in this context, as board members do not all come from all professional backgrounds. Other indicators related to more detailed professional experience of each member would be difficult to compare.

[18]Note also that attracting better-educated people is considered an essential goal of firm strategy and one of the main reasons behind the promotion of gender equality (see OECD, 2012).

to the law and not. Whenever the dependent variable is binary, we estimate a logit model instead of a linear model.

In Figures 3, 4, and 5, we present visual evidence on the fitness of our assumptions on the counterfactual time trend in absence of the reform. In particular, we show the evolution of female representation, education, and age over time. The dots show the average level of the outcome for boards that were not subject to the reform. The average outcome for "treated" boards in 2013 and 2014 is represented by the triangles. While up to 2012 all boards were "untreated", in 2013 1/3 of the boards had to comply with the new rules. In 2014, the share of treated boards increased to 2/3. Note that in 2014 the group of untreated boards is represented by firms that had board elections in the phase-in period (i.e. 2012), thus being able to endogenously adapt to the new rules.

Figure 3 shows that female representation increased linearly between 2007 and 2012. The jump in 2013 and 2014 clearly shows the magnitude of the change introduced by the reform. Similarly, the share of board members with at least a college degree in Figure 4 increased in a linear way between 2007 and 2012, whereas the time trend is flat when looking at the share of members with a graduate degree. Finally, Figure 5 shows that the share of board members younger than 55 largely followed a linear trend between 2007 and 2012, although the evidence is somewhat less smooth than in the previous graphs. Overall, the graphs show that a unique model may not fit the counterfactual trend for all of our outcomes of interest. Therefore, comparing the results from different assumptions may deliver more robust estimates of the reform effect.

In model 1, we assume no time trend in the evolution of the dependent variable between 2007 and 2014:

$$q_{it} = \gamma_0 + \gamma_1 \text{Reform}_{it} + \gamma_2 \text{Phase-in}_{it} + \gamma_3 \text{Members}_{it} + \phi_{\gamma,i} + \tilde{\gamma}_{it} \tag{1}$$

where q_{it} represents a characteristic of board i at the time t, Reform_{it} is a dummy variable equal to 1 if the board is subject to law at time t and 0 otherwise, Phase-in_{it} is a dummy equal to 1 if the board in that year of the election knows about the law but is not subject to it and 0 otherwise, Members_{it} represents the number of board members.

As an example, consider q_{it} as the percentage of members with a graduate degree. Results are

obtained under the assumption that in absence of the reform the percentage of members with a graduate degree would have remained the same as in the pre-reform period. Under this assumption, the comparison between boards subject and not subject to the reform identifies the causal effect of the quota law, γ_1.

In model 2 we assume a linear time trend: the outcome q_{it} would have grown in a linear way in absence of the reform.

$$q_{it} = \zeta_0 + \zeta_1 \text{Reform}_{it} + \zeta_2 \text{Phase-in}_{it} + \zeta_3 \text{Members}_{it} + \zeta_4 \cdot time + \phi_{\zeta,i} + \tilde{\zeta}_{it} \tag{2}$$

The variable $time$ is equal to 1 in 2007, to 2 in 2008, and so forth. Therefore, any deviation of treated boards from the expected linear trend identifies the causal effect of the reform, ζ_1.

Model 3 does not impose a parametric assumption on the time trend: the percentage of members with a graduate degree, in any year, is given by the mean observed in that year for all boards, whose elections may have happened in the years before. Since this specification includes all years – and not just the cross-sections of election years – we add a dummy variable indicating whether the board was elected in that year, Election_{it}:

$$q_{it} = \theta_0 + \theta_1 \text{Reform}_{it} + \theta_2 \text{Phase-in}_{it} + \theta_3 \text{Members}_{it} + \sum_{s=1}^{T} \theta_{4s} \cdot I(s = t) + \theta_5 \text{Election}_{it} + \phi_{\theta,i} + \tilde{\theta}_{it} \tag{3}$$

The deviation of treated boards from the mean identifies the causal effect θ_1. In all regression models we include board fixed effects ($\phi_{\gamma,i}, \phi_{\zeta,i}, \phi_{\theta,i}$). $\tilde{\gamma}_{it}$, $\tilde{\zeta}_{it}$, and $\tilde{\theta}_{it}$ are random errors, following a Type 1 Extreme Value distribution when q_{it} is a binary variable.

5.2   Results

Table 3 presents our results when we consider members of the board of directors. In Appendix Table A2 we present results for boards of auditors. Column 1 shows the results under the assumption of no time trend, column 2 assumes a linear trend, and column 3 assumes the time trend described by the data. Not surprisingly, the reform is significantly associated with an increase in the share of women directors in all columns. The increase ranges between 11.41 and 16.32 percentage

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points. Moreover, the reform caused a significant increase in the share of women on boards over the initial target of 20% in model 1 and 3.[19] The first model shows an increase in the share of female CEOs, although this result is not robust to the second and third specification. The share of female presidents on the board of directors significantly decreases in the third model, while female presidents of board of auditors significantly increase in all models (Table A2). Moving to our second group of outcomes – education – the reform significantly increases the share of members with a graduate degree in all models. The size of the increase ranges between 2.54 and 4.05 percentage points. Given that the average mean of the variable before the reform is 7.54, this is a large increase. The change seems to be due to women. There is however not a clear pattern for the undergraduate level of education. There is also a significant increase of board members who have studied abroad, in all models, and this is driven by women. There is no effect on the diversity of the fields of study. As for the fields of studies, we find a significant increase of members with a law degree in model 1 and 2.

Gender quotas are also associated with lower age of board members: the share of members younger than 55 years increases in the first and the third model, and this change does not seem to be gender-specific. Table 3 also shows that the gender quota reform is not associated with a clear significant change in the number of board members with a family relationship with the ownership. More precisely, we find a reduction in the number of family-related women in the first model and an increase of men in the third model. A major concern for the introduction of a gender quota law relates to the risk of appointing non-competent women (low-educated) linked to the owner's family. The evidence seems to allay this concern.

Finally, we examine whether gender quotas increase the holding of multiple positions. This is another common concern: if quotas result in the appointment of the same woman in all boards, then they would not reach the goal of giving opportunities to all qualified, potentially eligible individuals. As result, quotas may lead to a reduction in the quality of corporate governance. In Table 3, we find a significant overall small decrease in the average number of positions in the first

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[19]The law mandates to round up the number of women to be appointed to the nearest integer so as to reach 20% representation. The indicator variable *More than 20% women* is equal to one if the board appoints at least one additional woman above the mandated integer number of women.

model (driven by men) and a small increase in the number of positions in the second model (driven by women). The increase of positions held by women appears also in the third specification.

When considering heterogeneous effects, results in Table 3 are not driven by either larger or smaller firms, which may face different constraints in the supply of qualified female members. In fact, when we consider firms above and below the median value of assets in 2012, and run separate regressions for the two subgroups, results do not differ significantly between the two subgroups.[20] As a robustness check, we ensure that quotas are binding in most of our boards and that all effects remain if we exclude the few boards that already satisfied the required threshold in the pre-reform period (around 15% of the sample, mainly boards of auditors). All our significant effects related to women's empowerment, education, and age are even stronger (the coefficients are larger) if we only consider boards that had no women in the pre-reform period (50% of the sample), and thus had to implement more changes. The more substantial are the changes imposed by the quotas, the larger are the effects: what we observe are the consequences of a radical transformation of the status quo.[21]

5.3   Into the mechanism

What is the mechanism driving the observed changes to board characteristics after the implementation of gender quotas? We provide evidence that a possible mechanism lies in the selection process.

We focus on education and age, the two main variables where we have observed significant and sizeable changes after quotas. We split board members into three groups: retained, exiting, and new members.[22]

We consider two cohorts of firms. Figure 2 shows the timeline of the implementation of the law for the two cohorts of firms. Recall that boards in Italy are elected every three years. The first cohort had elections in 2007, 2010 (before the quota) and 2013 (after the quota), and the second cohort in 2008, 2011 (before the quota) and 2014 (after the quota). Table 4 shows the average for each variable before and after the quota, separately for each cohort. In Panel A we compare for

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[20]Results are available upon request.

[21]Results are available upon request.

[22]We are aware that re-appointments may be constrained by factors that we do not consider (such as the number of previous appointments). These factors are, however, time-invariant, and thus should not bias our analysis.

the first cohort of companies the last election before the quota (2010) and the first election after the quota (2013); in Panel B we compare for the second cohort the last election before the quota (2011) and the first election after the quota (2014). For the first cohort of companies (Panel A), in the pre-reform situation exiting members were more likely to have a college degree than retained ones. After the reform, instead, new members were significantly more educated than retained members, both in terms of college and graduate education, and have more college graduate than exiting members. For the second cohort of companies (Panel B) the pre-reform pattern is less clear: the average education level of retained members was not significantly different from that of exiting members, as retention is probably based on different criteria, while new members are more educated than retained and exiting. This is confirmed after the reform, with a very large difference observed between new and exiting or retained members for those with a graduate degree (men and women). For both cohorts, new male members appointed after the reform are significantly more educated (measured by college degree in panel A and graduate degree in panel B) than both retained and exiting male members. If we compare new members appointed before and after the reform, for both cohorts new members after the reform tend to be more educated in terms of graduate education than before.

Note that, when considering graduate education, the increase in the average education level of board members after the reform is slightly stronger in boards with a lower level of male education before the reform (those with education below the median value).[23] This result is in line with gender quotas playing a role in improving the selection of board members, especially when there is more room for improvement. Our results suggest that the gender quota reform may be associated with more public scrutiny and more attention to selection.[24]

Age follows a slightly different pattern: there is evidence that new members were significantly younger than retained (Panel A and B) and exiting members (Panel B) even before the reform, a fact that is confirmed after the reform. However, the reform seems to have accelerated the process.

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[23]Results are available upon request. For the other characteristics we do not detect significant heterogeneous effects in boards with a higher and lower level of male education before the reform.

[24]Other reforms associated with more public scrutiny may have a similar effect, but we focus on the causal impact of gender quotas. It is out of our scope to exclude that there may exist major board reforms different from gender quotas with a similar effect.

In the bottom panels of the table (Panel A4 and B4), we compare the characteristics of exiting males and new females after the reform. After all, since board size did not change (see Table 1), the reform required replacing male board members with female members.[25] For both cohorts, new female members are more educated than exiting male members (both college and graduate education in Panel A, only graduate education in Panel B). Female members are also significantly more likely to be younger than 55 than exiting males, suggesting that older male members were replaced by younger, more educated women.

Overall, the results confirm the patterns observed in Table 3: the reform increased the average level of education, for both men and women, whereas it favored the replacement of older members (i.e. older than 55) with younger ones.

6 Part II. The effects on performance

Do the changes to the boards induced by quotas translate into different performance? We turn to economic and financial outcomes and analyze the effects of gender quotas on firm performance. We consider board of directors, since such body has the decisional power over firm strategy. Following the literature (Ahern and Dittmar, 2012), we consider the following measures of firm performance, as explained in Section 4: number of employees, assets, production, profits, ROA, Tobin's Q and short-term debts. We also analyze the riskiness of the company's stock as measured by the variability of stock market prices (Bloom, 2014; Adams and Ragunathan, 2013; Adams and Ferreira, 2003). This choice is motivated by the literature on uncertainty (Bloom, 2014). Stock price volatility is a common measure of firm-level uncertainty, which is known to negatively affect firm investment, production, and the ability to hire workers.

We are aware that the time span after the quota law is still limited, and a final assessment of the effects of the reform may need more time. We thus interpret our results as the short-term effect of the reform.

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[25]It could be the case that the quota law is associated with a change in the number of board members: companies may try to elude the law by reducing the number of directors on each board. Alternatively, they may increase the size of the board in order to keep all incumbent male members. This did not significantly happen in Italy, as the average size of the board remained stable over time.

6.1 Methodology

We analyze the effect of a minimum period of time (one year) of women's participation on the boards on firm performance. For a firm subject to the law in 2013, the proportion of women on the board in 2013 is associated to firm outcomes in 2014, in order to allow one-year lag in the effects.[26] Thus, we use firm outcome data from 2011 to 2015 and data on the percentage of female directors on the board in the years 2010-2014. We start from a simple OLS regression that shows the correlation between the percentage of women directors on the board and measures of firm performance.

$$y_{jt} = \alpha + \beta \text{ Percentage women directors}_{j,t-1} + \gamma \text{Election}_{jt} + \tau_t + \phi_j + \epsilon_{jt} \tag{4}$$

where y_{jt} is the firm's outcome, represented by the (log of) number of employees, assets, production, profits, ROA, Tobin's Q, short-term debts, and monthly stock price volatility (computed as the monthly standard deviation in the stock price) for each firm j at time t, where t goes from year 2011 to 2015 for all outcomes, except for stock price volatility which is measured monthly; Percentage women directors$_{j,t-1}$ is the proportion of women on the board of directors of firm j at time $t-1$. Election$_{jt}$ is a dummy variable for whether firm j changed its board in year t (month t for stock price volatility), and τ_t and ϕ_j represent time and firm fixed effects.

We then move to addressing the endogeneity concerns associated with women's presence on the boards. The endogenous percentage of women directors is instrumented by a dummy variable Reform$_{jt}$ equal to 1 if the board of directors in that year is subject to the quota law and 0 otherwise, and a dummy variable Phase-in$_{jt}$, which is equal to 1 if in year t the firm knows about the new rules but is not subject to it.

These instruments affect the outcome variable only through the percentage of women. Moreover, the validity of the exclusion restriction is guaranteed by the fact that the date of the reform is exogenous to firms' characteristics, and that not all firms comply with the reform at the same date.[27]

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[26]Results are similar if we consider simultaneous effects.

[27]Given the staggered board elections across Italian companies, we can use the reform period as an instrument, rather

We also replace the percentage of female directors on the board with the instruments themselves, providing intention-to-treat estimates. The three models (OLS, ITT, IV) also include time dummies, and a dummy indicating whether the board election is held in that year, to avoid results being driven by other changes in that particular year rather than to the new composition of the board. We include firm fixed effects in all specifications.

6.2 Results

Table 5 shows non-significant relationships between the percentage of women directors and the measures of firm performance (column 1–7) in the basic OLS regression, apart from an increase of asset. We thus do not find positive association of women with performance, nor the presence of a "glass cliff" effect (Ryan and Haslam, 2005), i.e. women more likely to be appointed in positions that are risky or precarious, which are associated with lower firm performance.

When we move to the ITT and to the instrumental variable estimation in columns 1–7, all the considered performance outcomes are not significantly affected by the proportion of women on the board. Table 6 shows the first stage regression of our instrumental variable strategy. The reform and phase-in indicators strongly predict a higher share of female directors on boards. With a value of 119, the F-statistic of our first stage regression is well above the conventional significance threshold.

We also consider the monthly volatility of stock prices as a relevant outcome (column 8). In this case, the OLS estimates are not significantly different from zero. However, when we move to the ITT and to the instrumental variable estimation of the impact of the share of women on stock price volatility, we find a negative and significant effect. This may be interpreted as more gender-

than being forced to rely on the pre-quota percentage of female directors interacted with year dummies – which may raise endogeneity concerns – to make the instrument vary across firms, as in Ahern and Dittmar (2012) and Bertrand et al. (2019). More precisely, Ahern and Dittmar (2012) uses the distribution of female directors at the end-of-year 2002 as a measure of pre-quota variation in the number of female directors and finds detrimental effects of the law on firm performance. Eckbo et al. (2021), by using the distribution at the end-of-year 2001 (exogenous, by being observed before any announcement), does not find any significant results anymore. To provide direct comparison of our results with previous literature, we also use as an instrument the interaction between the reform period and the distance of the pre-reform share of women from the threshold of 20% (calculated as the difference between 20% and the percentage of women directors in 2010). Results, provided in Table A3, are broadly consistent with the ones presented in Table 5, although we find some positive effects on employment and assets that do not survive our specification in Table 5. Similar results as in Table A3 arise when using the distribution of the share of female directors in 2012 (when the Italian law was announced) and in 2011 (before the announcement) instead of 2010.

balanced boards being perceived by the market as less risky. In fact, women are perceived as more risk-averse than men (Jianakoplos and Bernasek, 1998; Sunden and Surette, 1998). More gender-balanced boards are not only in line with the quota requirements but they also align with one of the key objectives of current recommendations in terms of corporate governance.[28] This result is robust to the Bonferroni correction which we use to take into account the presence of multiple testing: the stock price standard deviation remains statistically significant at the 5 percent level.

Finally, we examine whether the negative effect of the share of female directors on the volatility of stock prices is driven by firms of particular industrial sectors, which may also have different financial performance independently of the presence of quotas. We perform separate regressions to find that the reduction in the monthly volatility is not driven by firms in the financial and consumer discretionary sectors, but rather by companies in industrial and other sectors. We also run separate regressions distinguishing between firms with assets above (large firms) and below the median value of assets (small firms) in every year, and find that the reduction in stock price volatility is significant in both groups.

7 Part III. Stock market reactions

As we consider listed companies, a natural way of evaluating the effects of the reform is to analyze the reaction of the stock market prices. We first focus on the stock market reactions to the announcement of the introduction of the quota law and then to the stock market reaction at the board election date. To assess the effects of the reform on the stock market returns, we consider the distance of the pre-reform share of women from the required threshold (20%) as a proxy for the magnitude of the changes to the composition of the board due to gender quotas.[29]

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[28]We instead do not find any significant effect of quotas on the variability of our performance measures. Results are available upon request.

[29]Again, we only consider boards of directors, which are formed on average by 10 members, without significant change in the board size after the reform (see Table 1). Thus, on average the quota requires at least 2 women per board, and they are 3 when the quota is exceeded. We will also control for board size.

7.1 The announcement

We run an event study at the date of approval of the quota law on June 28, 2011, and at the date of the approval of the draft of the law by the Italian Senate on March 15, 2011. These two dates were chosen after checking the news coverage of the quota law on Lexis-Nexis. As explained in section 3, the Italian public opinion was confronted with the concrete possibility of the enforcement of board gender quotas for the first time on March 15, 2011. Similarly, on June 28, 2011 the final approval of the law hit the news and generated a significant debate in the political arena.

The key focus of an event study is measuring the sample securities' mean and mean cumulative abnormal returns around the time of an event (Kothari and Warner, 2004). As the law announcement affected all firms at the same time, we estimate the abnormal returns around the event date using a procedure that allows accounting for the cross-correlation of stock returns (Eckbo et al., 2021).

First, we use a portfolio approach and check how different portfolios perform on the event dates relative to the holding period preceding the event. The holding period lasts 253 days, and we require each stock to be observed at least 100 days in order to be included in the estimation. For each stock j, we convert daily stock prices in dollar amount and calculate the stock price return on day t as the difference in the (log of the) closing stock price between t and $t-1$. We then obtain the excess return for each stock j, r_{jt}, by subtracting the daily return on 3-month US T-bills.

We estimate the following equation:

$$r_{jt} = \alpha + \beta R_{w,t} + \gamma_{AR} \cdot I(t=k) + \epsilon_{jt}, \tag{5}$$

where r_{jt} is the return for stock j on day t, $R_{w,t}$ is the excess return of the S&P Global index on day t relative to 3-month US T-bills, and $I(t=k)$ is an indicator variable for every day in the event window. We use the three days around the event as our estimation window: $k \in \{-1, 0, 1\}$, where 0 represents the event day. Therefore, γ_{AR} identifies the average daily excess return on the portfolio over the event window relative to the holding period preceding the event, holding constant global stock market factors as captured by the global index.

We form portfolios of Italian firms and compare their performance around the event date. We focus on the full sample of Italian stocks, and then split stocks into two portfolios based on the distance of the company's share of female board members from the law-mandated threshold. The results are presented in Table A5 in the Appendix. On June 28, the average daily excess return on the Italian portfolio is negative (but small), and not significantly different from zero. When splitting the portfolio, the return on the portfolio of less gender-diverse firms (i.e. above the median distance from the required threshold) is very similar to the return on the portfolio of more gender-diverse firms. None of the portfolio's returns is significantly different from zero, nor are the portfolios significantly different from one another. On March 15, the return on the Italian portfolio is positive. Again, the excess return of more and less gender-diverse portfolios is very similar, with no significant difference between the two groups. Therefore, using a portfolio approach we do not find convincing evidence of investors' reaction to the law on either date.

We then run a cross-sectional OLS regression of cumulative abnormal returns of Italian stocks around the event dates, again exploiting the cross-sectional gender composition of the board. Differently from the portfolio analysis, we now allow average daily abnormal returns around the event date to be firm-specific. Therefore, we estimate Equation 5 separately for each stock j; as our event window includes the three days around June 28, 2011 (March 15, 2011), the cumulative abnormal returns over the event are computed as $CAR_j = 3 \cdot \hat{\gamma}_{AR,j}$. We estimate the following cross-sectional specification:

$$CAR_j = \alpha + \delta \text{ Distance from threshold}_j + \phi X_j + \epsilon_j \tag{6}$$

where Distance from threshold$_j$ represents the difference between the share of female directors at the announcement date and the threshold required by the law, i.e. 20%. X_j is a vector of firm-specific control variables including board size, the log of assets, and industrial sectors. Table 7 presents the results. The estimates are consistent with the portfolio analysis: the coefficient on the distance from the law-mandated threshold is close to zero and insignificant in both regressions. Therefore, we are unable to conclude that the quota law triggered any significant reaction from

investors, neither on the day of its approval on June 28, 2011, nor during the policy debate on March 15, 2011.

7.2 The board elections

We now turn to stock market reactions to board elections. We have not found a significant stock market effect on the day of the approval of the law (or on March 15, during the policy discussion). Our approach is agnostic: even if investors did not react at the approval of the law, it may still be the case that the change of the boards induced by the appointment of women translate into an effect on stock market returns at the date of board election. In fact, it is only at the board election date that uncertainty on the new composition of the board is resolved. As shown by Tables 3 and 4, not only quotas led to the appointment of women directors, but also triggered a change in the composition of the entire board, where older members were replaced by younger and more educated directors.[30]

We run an event study over each board election date in the period 2011-2014, and calculate the abnormal returns for different event windows. We only focus on the election of the board of directors. For each stock j, we convert daily stock prices in dollar amount and calculate the stock price return on day t as the difference in the (log of the) closing stock price between t and $t-1$. We then obtain the excess return for each stock j, r_{jt}, by subtracting the daily return on 3-month US T-bills.

For each stock j, we estimate abnormal returns using a single factor market model:

$$r_{jt} = \alpha_j + \beta_j R_{w,t} + \epsilon_{j,t}, \tag{7}$$

where $R_{w,t}$ is the excess return of the S&P Global index on day t relative to 3-month US T-bills. The firm-specific parameters α_j and β_j are estimated over the period $(-252; -11)$, where day 0 represents the election day. The abnormal return for stock j at time t is then obtained as the

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[30]Board members' characteristics may have an impact on stock market returns *per se*. We find some evidence that in absence of quotas the election of board members with higher education and lower age is associated with better returns. Results are available upon request and shown in a previous version of the manuscript.

estimated residual from the previous regression:

$$AR_{j,t} = r_{j,t} - (\hat{\alpha}_j + \hat{\beta}_j R_{w,t}) \tag{8}$$

while the cumulative abnormal return $CAR_{j,(-T,T')}$ for stock j is the sum of the abnormal returns over the corresponding event window, from day $-T$ to day T'. We focus on the three, four, and five days around the board election date, and calculate cumulative abnormal returns for the windows $(-1, +1)$, $(-1, +2)$, and $(-2, +2)$.

In order to understand investors' reaction at the board election date for firms facing different requirements imposed by the law, we exploit the cross-sectional variation coming from the distance in the share of women directors from the required threshold at the board election date and the staggered introduction of quotas. We interact the distance in the share of women directors from the required threshold with three groups of board elections. The first group includes board elections before June 2011, when the quota law had not yet been approved; the second group includes phase-in elections, namely elections that took place when the quota law was not binding. The third group includes elections that took place after the quota law became binding, that is elections in 2013 and 2014.[31] Our estimation sample includes 183 firms, for which we are able to collect the exact board election date, stock price data, firm performance, and board characteristics before and after the election, including the gender composition of the board, education, and age of board members. Out of these firms, 42 had elections before quotas, 49 in the phase-in period, and 93 after quotas.

We estimate the following equation using the sample of cumulative abnormal returns over the period 2011-2014:

$$CAR_{jt} = \alpha + \beta \text{ Dist. from threshold}_{jt} + \gamma_1 \text{ Phase-in}_{jt} + \gamma_2 \text{ After quotas}_{jt}$$

$$+ \delta_1 \text{ Dist. from threshold} \times \text{Phase-in}_{jt} + \delta_2 \text{ Dist. from threshold} \times \text{After quotas}_{jt} + \phi Z_{jt} + \epsilon_{jt} \tag{9}$$

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[31]To address the possible anticipation effect, we also use the date of announcement of the lists of candidates for board membership. Results, available upon request, are very similar, although we miss some information due to more limited data availability.

Dist. from threshold$_{jt}$ is the usual variable that represents the difference between the target threshold of 20% and the share of women on the board before the election. Phase-in$_{jt}$ is an indicator variable for elections in the phase-in period, and After quotas$_{jt}$ is an indicator for elections after quotas became binding, namely elections in 2013 and 2014. Z_{jt} is a vector of firm-level control variables, and ϵ_{jt} represents the error term. Our preferred specification includes firm size, ROA, and the number of elected board members. We also check whether our estimates are robust to the introduction of additional characteristics of elected board members, such as age and education. As shown in the previous sections, however, these characteristics are endogenous to the reform and likely correlate with the board-specific distance from the threshold at the election date.[32] We cluster the standard errors in the month-year of board election to account for the cross-correlation of the error term for stocks of companies that changed boards in the same time period.

Table 8 shows the results. For elections taking place after quotas, the coefficient on the interaction term with the distance from threshold variable is positive: a higher distance from the target threshold, i.e. a larger number of women appointed in order to comply with the quota, results in higher cumulative returns over the election period. The coefficient on the interaction term is also positive and large for elections in the phase-in period. This is due to the fact that many companies adapted to the new rules even when not required to do so by law. As shown by Table 8, in the estimating sample of firms the share of women elected in the phase-in period is 14% on average. Relative to the pre-reform period, the share of women on boards almost doubled in the phase-in, an increase that is much larger than what the trend would have predicted (see Figure 3).[33] For pre-reform elections, the omitted group in the regression, the coefficient on the distance from the target threshold is small in column (1), and flips in sign in columns (2) and (3). The point estimates in column (1) imply that increasing the distance from the target threshold by 1 percentage point increases cumulative abnormal returns by 0.0006 after quotas $\left(\frac{0.0043+0.0526}{100}\right)$. Relative to an average CAR of 0.003, this effect is large (16%). It's worth noting, however, that our estimates are noisy, possibly due to the small number of observations in our sample. Changing the event window in columns (2) and (3) changes the implied CARs and the quantitative interpretation of our

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[32]Results are not shown.

[33]The difference across the two groups is significant at the 5% level.

estimates, but the main qualitative findings in column (1) are confirmed. While we are cautious in quantitatively interpreting the magnitude of our coefficients, we feel more confident in excluding any negative effects of quotas at the election of board members. If anything, investors positively reacted to the appointment of women on boards, both in the phase-in period and when women directors were mandated by law.

8 Discussion and Conclusions

We have analyzed the effects of the introduction of a gender quota law on boards of listed Italian companies according to several dimensions: the change to board characteristics, the effects on firm performance, and the stock market reaction to the announcement of the law and to board elections. We show that quotas are associated with a larger share of women directors, well above the required threshold, with higher average education of board members and a lower share of older members. These results suggest that the gender quota law significantly changed the selection process of board members. Changes may be costly, at least in the short run. However, we are able to reject the existence of a negative impact of gender quotas on economic performance, while we observe a lower variability of stock market prices. As we analyze the short-term effects of the reform, we are not able to provide a final answer on firm performance. However, we do find a non-negative reaction of investors at the board elections.[34]

Are board gender quotas improving female representation beyond the boards, i.e. generating a cascade effect from top to bottom? Bertrand et al. (2019) doubt that this happened in Norway. Future research will assess whether similar doubts apply also to the Italian case.

Our results for the Italian case are particularly interesting because the pre-existing causal evidence on the effects of board gender quotas is limited to Norway. We study a different context and a more gradual law reform, thus expanding the set of cases that have been studied. Italy offers a different, clear scenario which contributes substantially to our broad knowledge of the economic effects of board gender quotas. Italy and Norway are very different when looking at gender statistics:

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[34]Another unintended consequence of the Norwegian law is the delisting of companies (Bohern and Staubo, 2014). We do not find evidence of this effect for the Italian case.

Panel A of Table 9 shows gender attitudes measured by the share of people who agree with specific statements posed by the European Value Survey and Panel B shows female labor force participation rates in the two countries. In these different contexts, the characteristics of board of directors in the status quo before the reform were also very different between the two countries (see Table 9 Panel C and D). Norway presents a higher level of education and a lower average age of board members in the period preceding the reform compared to Italy. In both cases, the level of education increases after the introduction of the quota (Ahern and Dittmar, 2012), while the change in age appears to be stronger in the Italian case.[35] In other words, in Norway, the status quo before the reform was less critical than in Italy, where it was less favorable to qualified people. More generally, as Norway is nurtured by gender equality principles and Italy is far from that, consistently with our findings, the overall re-organization process induced by the reform is likely to be stronger in Italy. Note also that, although there exist specific requirements for boards of less than 10 members, the Norwegian reform imposed a jump up to 40% in female representation (existing firms have to comply by January 2008, while new firms by January 2006), while the gradualism of the target imposed by the Italian law (20% and then 33%) may have helped firms to select the more appropriate candidates and to fully exploit the beneficial effects of the re-organization process. As already noticed, if we compare directly the characteristics of new female members and exiting male members to understand the effects of the changes on the overall composition of the board, we find that the substitution between men and women increases the qualifications of board members. This result is in line with what has been found in the context of politics by Baltrunaite et al. (2014) and Besley et al. (2013).

The result that quotas may be associated with an increase in quality is a general one. Theoretically, quotas may have ambiguous effects on efficiency: on one side they are a constraint which may reduce quality if the status quo was already efficient, and on the other side they may improve quality if they force to change an inefficient status quo. Thus, as acknowledged by recent research (see Bagues et al., 2017), quotas may be desirable or not depending on the specific context. Our results

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[35]Ahern and Dittmar (2012) highlight the role of previous experience as CEO, while we focus on the role of education, because the share of Italian women with CEO experience is close to zero, and thus the effect would be mechanical. We thus consider education a more interesting characteristic, as explained in Part I.

show that boards of directors in Italy may be in this second situation. Our argument is supported by some interesting anecdotal evidence. During the discussion around the introduction of the Italian law, two facts rapidly became clear: first, the law had the potential to threaten the so-called "old-boys club", which dominated boards of directors prior to the introduction of the quota law, not necessarily because of their competence. Second, competent women were abundant: several lists with thousands of CVs of board-ready women were collected by women's associations, institutions, and business schools (see Profeta et al., 2014). Our results suggest that gender quotas may be a policy tool to exploit abundant unused female talent.

As other countries and states, such as France, Germany, and recently California, have introduced board gender quotas, future studies will assess whether the results obtained for the Italian case are confirmed in other contexts. Further analyses are also needed to investigate whether performance will change in the long-run and whether the new selection process initiated by the introduction of gender quotas will survive when quotas, which are temporary, will be no longer in force.

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9 Figures

Figure 1: Timeline of implementation of the gender quota law
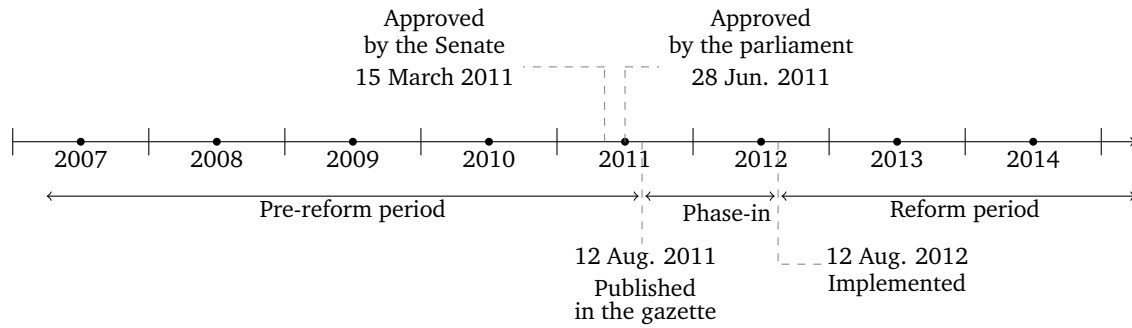
Figure 2: Timeline of board elections
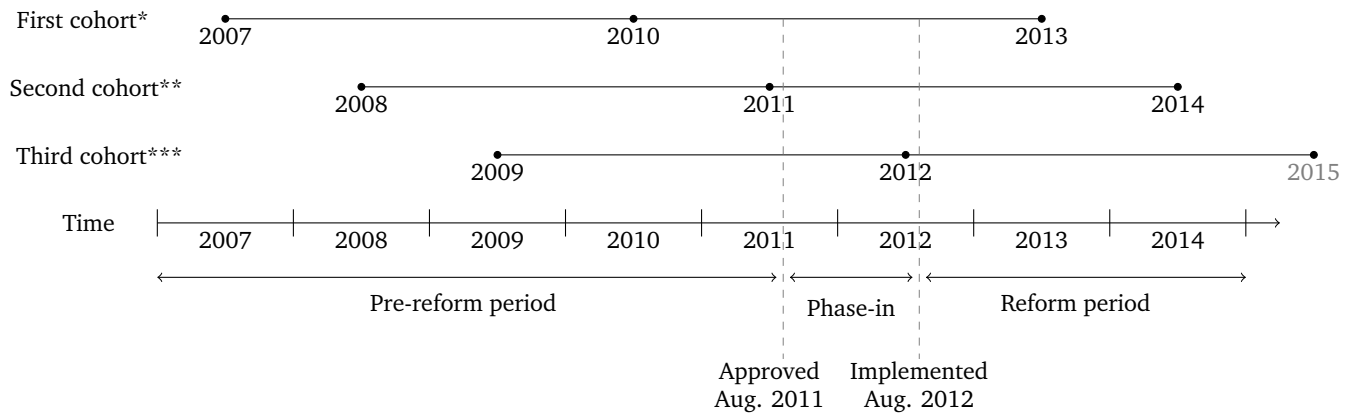
Notes:The figure represents the timeline of the implementation of the law (on the time axis) and the timing of board elections.
*Board elections in years 2007, 2010, and 2013, from April to June.
**Board elections in years 2008, 2011, and 2014, from April to June.
***Board elections in years 2009 and 2012, from April to June.

Figure 3: Women's empowerment
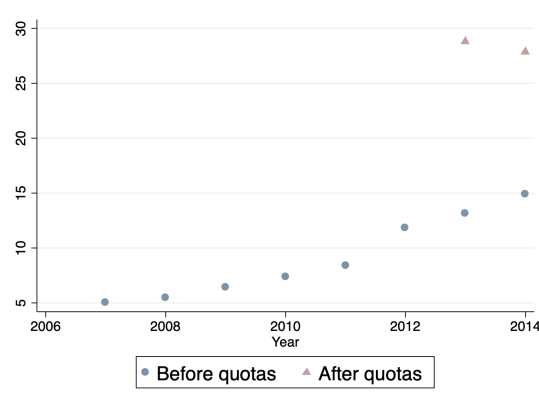
(a) Percentage of women
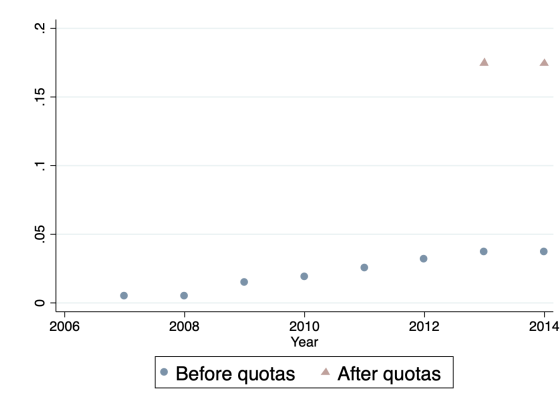
(b) More than 20% of women

Figure 4: Education
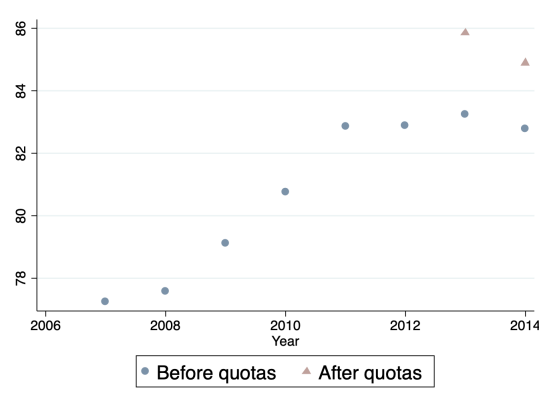
(a) % college degree
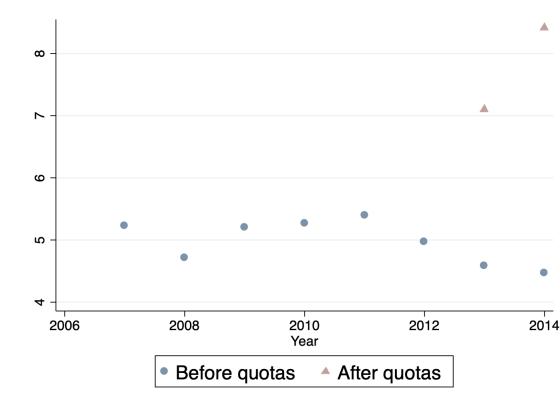
(b) % graduate degree

Figure 5: % younger than 55
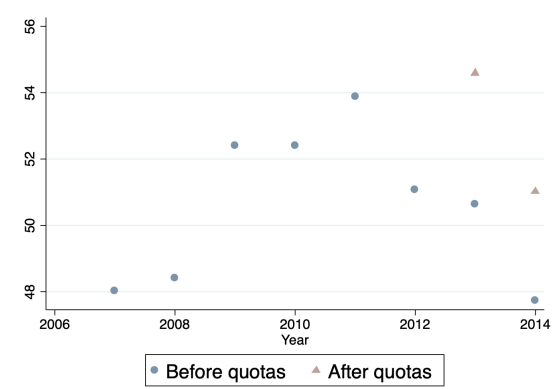
10 Tables

Table 1: Summary statistics: board characteristics

		2007	2008	2009	2010	2011	2012	2013	2014
Panel A. Board of Directors									
Number of members		9.90	10.02	9.95	9.97	9.94	9.91	9.93	9.86
Percentage of women		5.90	6.15	6.84	7.65	9.42	12.46	17.83	20.97
More than 20% women		0.00	0.01	0.02	0.03	0.04	0.04	0.12	0.17
Female CEO		0.03	0.03	0.06	0.07	0.06	0.06	0.05	0.09
Fem. president		0.01	0.03	0.05	0.05	0.05	0.04	0.04	0.03
% college degree		71.38	72.33	74.43	75.62	77.90	78.87	80.27	79.87
	F	66.87	66.57	66.16	70.54	76.95	81.44	81.68	82.19
	M	71.50	72.69	75.01	76.16	78.16	78.71	79.85	79.17
% graduate degree		8.02	7.57	8.15	7.62	7.54	7.02	7.58	9.82
	F	10.64	9.69	10.70	9.57	10.84	9.38	12.34	16.49
	M	7.80	7.36	7.94	7.46	7.24	6.68	6.62	7.68
% studied abroad		4.52	4.67	4.43	4.26	4.44	5.33	5.56	6.89
	F	3.01	2.91	4.21	4.40	5.51	7.49	7.41	10.13
	M	4.46	4.56	4.28	4.07	4.28	4.81	4.82	5.34
Field diversity		0.47	0.47	0.47	0.47	0.47	0.48	0.47	0.46
% economics degree		34.39	35.57	37.05	38.59	40.41	42.24	42.22	41.85
	F	36.35	35.08	30.77	35.02	39.15	42.56	39.71	41.54
	M	34.15	35.47	37.33	38.76	40.56	42.46	42.92	41.67
% law degree		12.32	12.06	12.46	12.87	12.68	12.68	13.96	14.51
	F	10.34	7.66	10.30	10.52	11.99	14.47	17.66	19.11
	M	12.44	12.38	12.76	13.12	12.75	12.43	13.12	13.38
% younger than 55		46.59	45.53	48.57	47.75	49.76	48.08	49.03	47.25
	F	61.79	60.49	63.81	66.23	70.70	73.50	74.69	72.48
	M	45.70	44.72	47.56	46.45	47.58	45.17	43.70	40.81
% family ties		13.94	12.87	7.79	8.04	7.96	11.93	11.18	11.51
	F	37.55	34.21	19.02	17.65	15.34	19.01	14.66	13.29
	M	12.47	11.37	6.81	7.06	7.25	10.88	10.69	11.17
Number of positions		1.46	1.44	1.39	1.33	1.30	1.29	1.31	1.30
	F	1.50	1.51	1.46	1.32	1.18	1.19	1.24	1.30
	M	1.46	1.44	1.39	1.34	1.32	1.31	1.33	1.30
Retained		.	.	.	0.67	0.56	0.54	0.49	0.54
Number of boards		202	204	212	220	229	232	245	235
Panel B. Board of Auditors									
Number of members		3.03	3.06	3.11	3.12	3.10	3.09	3.11	3.12
Percentage of women		4.20	4.86	6.01	7.04	7.24	11.11	18.41	23.70
More than 20% women		0.01	0	0.01	0.01	0.01	0.02	0.04	0.05
Fem. president		0.01	0.01	0.02	0.01	0.02	0.04	0.07	0.21
% college degree		82.97	82.60	84.20	86.37	88.30	87.29	88.19	88.77
	F	75	82.76	80.56	87.80	84.09	85.32	86.69	89.83
	M	83.13	82.76	84.52	86.46	88.39	87.05	88.16	87.92
% graduate degree		2.29	1.79	2.31	2.69	3.04	2.70	2.98	3.05
	F	0.00	0.00	0.00	0.00	0.00	0.00	1.68	4.04

Continued on next page

42

Table 1: Summary statistics: board characteristics

		2007	2008	2009	2010	2011	2012	2013	2014
	M	2.64	1.79	2.47	2.86	3.20	3.02	3.50	3.07
% studied abroad		0.69	0.34	0.00	0.17	0.16	0.16	0.00	0.33
	F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47
	M	0.78	0.43	0.00	0.17	0.16	0.16	0.00	0.00
Field diversity		0.85	0.85	0.86	0.88	0.88	0.89	0.89	0.88
% economics degree		70.35	70.21	73	76.27	78.12	78.37	79.22	79.48
	F	62.50	62.07	66.67	75.61	75	78.86	78.43	80.39
	M	70.40	70.74	73.33	76.48	78.12	77.98	78.93	78.28
% law degree		7.80	7.68	7.37	7.32	7.84	7.14	7.52	7.48
	F	12.50	20.69	13.89	12.20	9.09	6.47	7.42	7.97
	M	7.63	7.00	6.88	6.83	7.61	6.97	7.58	7.55
% younger than 55		49.51	51.44	56.44	57.47	58.42	54.35	54.99	52.31
	F	68.75	68.97	66.67	70.73	75.00	76.37	80.25	78.68
	M	48.17	50.47	56.07	56.72	56.81	51.69	49.00	43.73
% family ties		0.69	0.34	0.33	0.33	0.32	1.11	1.33	1.49
	F	0.00	0.00	0.00	0.00	0.00	1.49	1.68	1.47
	M	0.87	0.51	0.50	0.50	0.48	1.27	1.40	1.58
Number of positions		1.57	1.47	1.39	1.36	1.33	1.26	1.29	1.29
	F	1.08	1.14	1.07	1.06	1.06	1.14	1.23	1.29
	M	1.59	1.48	1.41	1.37	1.35	1.29	1.32	1.31
Retained		.	.	.	0.68	0.66	0.59	0.49	0.47
Number of boards		192	195	200	201	208	210	226	201

Notes: Averages of board characteristics of Italian listed companies over the period 2007-2014.

Table 2: Summary statistics: firm characteristics

	2011	2012	2013	2014	2015
Firm characteristics:					
Employees	2,184.46	2,169.54	2,532.78	1,620.92	7,083.59
Production	696,312.46	728,536.15	692,906.69	679,326.92	4,101,473.99
Profits	-9,517.09	63,515.36	1,956.88	15,829.75	37,436.78
Assets	7,488,368.07	7,722,821.31	7,206,096.60	6,399,380.74	18,624,508.62
ROA	-0.43	-2.14	-1.90	-0.59	1.96
Short-term debt	0.64	0.63	0.70	0.67	0.44
Tobin's Q	0.90	0.76	0.78	0.85	0.98
Industrial sectors:					
Consumer	0.26	0.26	0.27	0.27	0.27
Industrial	0.17	0.17	0.17	0.17	0.18
Financials	0.24	0.25	0.24	0.24	0.24
Other	0.32	0.32	0.32	0.32	0.31
Number of firms	213	212	209	209	204

Notes: Averages of firm characteristics of Italian listed companies over the period 2011-2015.

Table 3: Board of Directors – Effect on board characteristics

Assumption on time trend:		No trend			Linear trend			Non-parametric		
	Mean before quotas		R^2	N		R^2	N		R^2	N
Percentage of women	9.42	16.32*** (0.90)	0.53	582	11.41*** (1.77)	0.54	582	12.70*** (1.02)	0.46	1779
More than 20% women	0.04	2.42*** (0.48)		109	1.24 (1.18)		109	4.25*** (1.47)		311
Female CEO	0.06	1.26** (0.56)		59	0.94 (1.27)		59	0.67 (1.19)		200
Fem. president - BoD	0.05	-1.03 (0.83)		33	-0.96 (1.39)		33	-2.52* (1.42)		109
% university degree	77.90	4.63*** (1.28)	0.04	582	-5.20** (2.47)	0.10	582	-1.81 (1.44)	0.11	1779
F	76.95	3.08 (3.39)	0.02	396	-10.52 (7.00)	0.04	396	-7.48** (3.68)	0.04	1090
M	78.16	3.65*** (1.26)	0.03	581	-5.68** (2.44)	0.08	581	-2.05 (1.46)	0.10	1778
% graduate degree	7.54	4.05*** (1.03)	0.08	582	5.75*** (2.05)	0.09	582	2.54** (1.12)	0.05	1779
F	10.84	9.02*** (3.13)	0.09	396	9.62 (6.55)	0.09	396	7.72** (3.07)	0.08	1090
M	7.24	1.14 (0.94)	0.03	581	2.85 (1.86)	0.03	581	0.76 (1.06)	0.03	1778
% studied abroad	4.44	2.51*** (0.80)	0.05	582	3.60** (1.59)	0.05	582	1.73** (0.86)	0.02	1779
F	5.51	5.08** (1.97)	0.04	396	7.89* (4.12)	0.04	396	3.28* (1.96)	0.03	1090
M	4.28	0.86 (0.67)	0.01	581	1.34 (1.34)	0.01	581	0.19 (0.79)	0.00	1778
Field diversity	0.47	-0.02 (0.01)	0.04	581	-0.01 (0.03)	0.05	581	-0.01 (0.02)	0.03	1774
% economics degree	40.41	3.18** (1.46)	0.02	582	-4.73* (2.86)	0.05	582	-1.95 (1.69)	0.06	1779
F	39.15	1.13 (3.62)	0.05	396	-5.64 (7.55)	0.05	396	-4.42 (3.98)	0.06	1090
M	40.56	2.11 (1.51)	0.01	581	-5.00* (2.97)	0.04	581	-1.74 (1.74)	0.06	1778
% law degree	12.68	3.04*** (0.81)	0.04	582	0.86 (1.61)	0.05	582	3.25*** (0.99)	0.03	1779
F	11.99	5.82** (2.81)	0.05	396	-1.82 (5.83)	0.06	396	0.24 (3.00)	0.05	1090
M	12.75	1.30 (1.51)	0.01	581	-0.56	0.02	581	1.81*	0.01	1778

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Table 3: Board of Directors – Effect on board characteristics

Assumption on time trend:		Mean before quotas	No trend	R^2	N	Linear trend	R^2	N	Non-parametric	R^2	N
% younger than 55		49.76	3.31** (0.85)	0.04	582	-0.19 (1.69)	0.05	582	4.07** (1.04)	0.07	1779
	F	70.70	-2.64 (1.47)	0.01	396	-5.65 (2.92)	0.01	396	0.30 (1.89)	0.03	1090
	M	47.58	-2.72* (4.14)	0.06	581	-4.37 (8.66)	0.06	581	0.01 (4.74)	0.07	1778
% family ties		7.96	-0.46 (1.53)	0.15	582	0.25 (3.05)	0.15	582	1.95 (2.00)	0.11	1779
	F	15.34	-7.59** (0.99)	0.10	396	-0.95 (1.98)	0.11	396	-0.30 (1.32)	0.11	1090
	M	7.25	1.00 (3.21)	0.14	581	0.55 (6.69)	0.14	581	2.55** (3.89)	0.10	1778
Number of positions		1.30	-0.07** (0.94)	0.03	582	0.12** (1.87)	0.08	582	0.03 (1.25)	0.09	1779
	F	1.18	0.01 (0.03)	0.06	396	0.51*** (0.05)	0.12	396	0.19** (0.03)	0.12	1092
	M	1.32	-0.08*** (0.08)	0.03	580	0.07 (0.17)	0.06	580	0.02 (0.09)	0.07	1776

Notes: The table shows the coefficient on the reform indicator in a regression where the dependent variable is shown in the first column. In every regression, we control for the number of board members and the phase-in period. The three specifications for every regression correspond to different assumptions on the time trend. In the first two specifications ("No trend" and "Linear trend") observations are for election years over the period 2007-2014. In the third specification, we include observations over all years between 2007 and 2014, and add an election year fixed effect. The models with dependent variable *More than 20% women*, *Female CEO*, and *Female President* are estimated using a logit model, which explains the lower number of observations. The others are estimated using a linear model. Every regression controls for board fixed effects. Standard errors are clustered at the board level. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 4: Characteristics of retained, exiting, and new members

Panel A. 2010-2013 cohort

	Ret. (1)	Exit. (2)	New (3)	1–2	2–3	1–3	Ret. (4)	Exit. (5)	New (6)	4–5	5–6	4–6	1–4	2–5	3–6
	Before quotas: 2010						*After quotas: 2013*						*Difference 2010-2013*		
													Ret.	*Exit.*	*New*
Panel A1. All directors															
% college	82.35	91.26	91.7	***		***	87.29	88.73	93.48		**	***	*		
% graduate	6.90	8.7	6.94				6.23	8.63	10.86			***			*
% < 55 yrs	36.43	45.14	49.56	**		***	37.2	43.06	54.38		***	***			
Panel A2. Women															
% college							84.90	100	93.75		**				
% graduate							3.63	0	15.91		**				
% < 55 yrs							67.27	55.55	76.36						
Panel A3. Men															
% college							87.63	88.32	93.31		**	**			
% graduate							6.58	8.92	7.69						
% < 55 yrs							33.17	42.64	40.57	**		**			

Panel A4. Comparison: new women and exiting men

	After quotas: 2013		
	New women	Exiting men	Difference
% college	93.75	88.32	5.42**
% graduate	15.9	8.9	7.00**
% < 55 yrs	76.36	42.64	33.72***

Panel B. 2011-2014 cohort

	Ret. (1)	Exit. (2)	New (3)	1–2	2–3	1–3	Ret. (4)	Exit. (5)	New (6)	4–5	5–6	4–6	1–4	2–5	3–6
	Before quotas: 2011						*After quotas: 2014*						*Difference 2010-2014*		
													Ret.	*Exit.*	*New*
Panel B1. All directors															
% college	86.86	86.58	92.5		**	**	89.12	89.94	93.47		***	***			***
% graduate	3.81	7.94	8.33	**		***	5.36	6.66	25.49		***	***			***
% < 55 yrs	43.99	39.18	55.75		***	***	39.95	54.06	62.18	***	**	***		***	
Panel B2. Women															
% college							87.75	92.68	92.66						
% graduate							11.11	7.14	32.11		***	***			
% < 55 yrs							67.92	76.19	75.23	*	**	***			
Panel B3. Men															
% college							89.32	89.61	94.11						
% graduate							4.49	6.61	20.42		***	***			
% < 55 yrs							35.17	51.42	51.87	***		***			

Panel B4. Comparison: new women and exiting men

	After quotas: 2014		
	New women	Exiting men	Difference
% college	92.66	89.61	3.5
% graduate	32.11	6.61	25.4***
% < 55 yrs	75.23	51.42	23.81***

Notes: Data are averages of board members' characteristics, distinguishing between retained, exiting, and new members for each board election. Panel A shows the average characteristics of members of firms in the cohort 2007-2010-2013; Panel B shows the average characteristics of members of firms in the cohort 2008-2011-2014. *% college* indicates the share of members with at least a college degree; *% graduate* indicates the proportion of board members with a graduate degree (Master's degree, PhD, MBA); *% < 55* indicate the percentage of members younger than 55. The significance of the difference between groups 1, 2 and 3, and 4, 5 and 6 is tested in the adjacent columns. The last three columns test the difference between each group across different years. The level of significance of the difference is reported as: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 5: The effect of women directors on economic performance and variability of stock market prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(empl.)	Log(prod.)	Log(profits)	Log(assets)	ROA	Tobin's Q	Short-term debt	Sd(stock prices)
Panel A. OLS								
Percentage of women	-0.004	-0.007	0.002	0.004*	-0.060	0.000	-0.000	-0.002
	(0.005)	(0.007)	(0.009)	(0.002)	(0.045)	(0.002)	(0.001)	(0.002)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.418	0.343	0.082	0.184	0.034	0.082	0.251	0.168
Panel B. ITT								
Reform	0.146	-0.097	-0.262	0.074	-0.758	-0.021	0.014	-0.002***
	(0.205)	(0.280)	(0.312)	(0.085)	(1.871)	(0.076)	(0.046)	(0.000)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.418	0.342	0.084	0.183	0.031	0.083	0.257	0.165
Panel C. IV								
Percentage of women	0.009	-0.006	-0.009	0.008	-0.039	-0.000	0.004	-0.016***
	(0.014)	(0.018)	(0.026)	(0.006)	(0.136)	(0.006)	(0.003)	(0.003)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.412	0.343	0.078	0.179	0.033	0.082	0.228	0.159
Mean of dep. var.	5.676	11.183	9.583	13.152	-0.674	0.847	0.613	0.021
N	874	782	566	892	899	875	776	7,662

Notes: Results of the regressions of firm performance measures (yearly observations from 2011 to 2015, column 1 to 7) and monthly standard deviation of stock prices (monthly observations, column 8) on the lagged percentage of female directors (observations from 2010 to 2014). The table shows estimates for OLS, intention to treat (ITT), and instrumental variable (IV). Year fixed effects are included for columns 1 to 7 and month fixed effects for column 8. We include dummies for election years (months in column 8). The ITT regression in Panel B includes an indicator for the phase-in period. The first stage of the IV regression is reported in Table 6. Standard errors are clustered at the firm level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 6: IV regression: first stage

	(1)
	Percentage of women
Reform	10.775***
	(1.379)
Phase-in	2.759**
	(1.251)
Year of election FE	Y
Firm FE	Y
Year FE	Y
Observations	1,047
Mean of dep. var.	13.381
F	119.88

Notes: First stage regression. Yearly observations between 2010 and 2014. Standard errors are clustered at the firm level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 7: Effect of the announcement of the quota law on cumulative abnormal returns

	(1) June 28, 2011	(2) March 15, 2011
Distance from thres.	-0.0004	0.0000
	(0.0003)	(0.0005)
Board size	0.0002	0.0026**
	(0.0007)	(0.0011)
Log(assets)	0.0021	-0.0028
	(0.0015)	(0.0022)
N	188	187
R-squared	0.1211	0.0970
Mean of dep. var.	-0.0016	0.0123

Notes: Results of the event study on June 28, 2011 and March 15, 2011. Regressions are cross-sectional OLS regression of cumulative abnormal returns of Italian firms. Cumulative abnormal returns are the sum of abnormal returns over the three days surrounding the reform announcement ($(-1;+1)$ event window). *Distance from threshold* is a continuous variable constructed as 20% – percentage of women on board at the date of announcement. Board size is the number of board members. Robust standard errors in parenthesis. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 8: Effect of the quota law on cumulative abnormal returns around the board election date

	(1)	(2)	(3)
		CARs over the event window:	
	$(-1;+1)$	$(-2;+1)$	$(-2;+2)$
Distance from threshold	0.0043	-0.0703+	-0.0887
	(0.0307)	(0.0460)	(0.1058)
Phase-in	-0.0094***	-0.0132**	-0.0318*
	(0.0025)	(0.0057)	(0.0168)
After quotas	-0.0050	-0.0205**	-0.0321*
	(0.0039)	(0.0084)	(0.0168)
Distance from threshold × Phase-in	0.0964**	0.1376**	0.1919+
	(0.0436)	(0.0665)	(0.1312)
Distance from threshold × After quotas	0.0526+	0.1247*	0.1602+
	(0.0380)	(0.0608)	(0.1115)
Log(assets)	-0.0006	0.0013	0.0012
	(0.0017)	(0.0019)	(0.0019)
ROA	-0.0002	-0.0003	0.0001
	(0.0005)	(0.0004)	(0.0004)
Board size	-0.0013**	-0.0022**	-0.0022**
	(0.0006)	(0.0009)	(0.0008)
N	183	183	183
R-squared	0.0481	0.0546	0.0547
Mean CAR	0.0034	0.0024	-0.0009

Mean share of women elected:

Before quotas	0.086
Phase-in	0.141
After quotas	0.245

Notes: OLS regressions of cumulative abnormal returns (CARs) of Italian listed companies on board-level variables and firm characteristics. CARs are computed over different windows around the election day. *Distance from threshold* is constructed as 20% − percentage of women on board before the board election. *Phase-in* is a dummy variable for board elections in the period from August 2011 to August 2012; *After quotas* is a dummy variable for board elections in 2013 and 2014. The omitted category are board elections before quotas (in 2011, up to June). Standard errors are clustered at the election date level (month-year). $+p < 0.20$ $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 9: Status quo: Italy and Norway

		Italy			Norway	
Panel A. Gender attitudes, 2008-2009						
% Agrees with:						
(1) "When jobs are scarce men should have more right to a job than women"		21%			3%	
(2) "A pre-school child suffers if the mother works"		75%			19%	
Panel B. Female labor force participation		2005	2010	2015	2005	2010	2015
Female LFP		38.1	38.2	39.8	68.7	68.7	68.3
Panel C. Board-level variables		2009	2010	2011	2001	2002	2003
Number of members		10.27	10.01	9.93	5.54	5.53	5.39
Share of women (%)		6.54	7.42	9.12	5.42	7.47	10.97
Higher education (%)					25.38	26.15	28.14
Graduate degree (%)		7.91	7.75	7.65			
Age		54.67	54.89	54.74	50.47	51.25	51.47
Std. dev. age		10.93	10.92	10.88	7.87	8.15	8.08
Retained from previous year			49.50	47.08		78.22	80.23
Number of positions		1.41	1.33	1.27	1.94	2.03	2.13
Observations		199	218	226	127	119	113
Panel D. Individual variables						
Age	Women	49.87	49.82	49.10	46.46	47.88	47.55
	Men	55.44	55.82	55.83	50.51	51.18	52.34
Higher education (%)	Women				25	26.67	34.15
	Men				23.80	22.66	22.83
Graduate degree (%)	Women	12.69	9.88	11.22			
	Men	7.70	7.77	7.55			
Number of positions	Women	1.41	1.30	1.19	1.08	1.22	1.22
	Men	1.48	1.41	1.34	1.18	1.18	1.21
Observations	Women	134	162	205	50	55	69
	Men	1914	2020	2042	653	591	541

Notes: Sources: European Value Survey 2008-2009 (Panel A), OECD Statistics (Panel B), Ahern and Dittmar (2012) (Panel C and D for Norway), and own data (Panel C and D for Italy). In Panel C and D, data are averages of average boards' of director characteristics (Panel C) and averages of directors' characteristics (Panel D) over the three years preceding the introduction of the quota law. Data for Norway are from Ahern and Dittmar (2012).

Data on education are not strictly comparable. In Ahern and Dittmar (2012), higher education refers to board members with a postbaccalaureate degree, including MA, MS, MD, JD, and PhD. In our analysis, graduate degree refers to members with a Master's program, PhD, and MBA.

Table A1: Summary statistics, individual-level data

		2007	2008	2009	2010	2011	2012	2013	2014
Panel A. Board of Directors									
College degree	All	0.83	0.84	0.85	0.84	0.85	0.86	0.88	0.88
	F	0.68	0.69	0.71	0.76	0.83	0.88	0.90	0.90
	M	0.84	0.85	0.86	0.85	0.85	0.86	0.88	0.87
Graduate degree	All	0.08	0.07	0.08	0.08	0.08	0.07	0.08	0.1
	F	0.09	0.08	0.10	0.09	0.11	0.10	0.14	0.18
	M	0.08	0.07	0.08	0.08	0.07	0.07	0.07	0.08
Studied abroad	All	0.08	0.09	0.08	0.08	0.08	0.09	0.07	0.08
	F	0.06	0.07	0.07	0.08	0.09	0.12	0.10	0.12
	M	0.08	0.09	0.08	0.08	0.08	0.08	0.07	0.07
Economics degree	All	0.37	0.38	0.37	0.38	0.4	0.42	0.42	0.42
	F	0.39	0.36	0.31	0.34	0.40	0.43	0.41	0.43
	M	0.37	0.38	0.38	0.39	0.40	0.42	0.42	0.42
Law degree	All	0.15	0.14	0.14	0.14	0.14	0.13	0.15	0.15
	F	0.10	0.08	0.10	0.10	0.11	0.14	0.19	0.20
	M	0.15	0.15	0.15	0.14	0.14	0.13	0.14	0.14
Younger than 55	All	0.44	0.44	0.46	0.46	0.48	0.45	0.47	0.46
	F	0.65	0.62	0.59	0.64	0.71	0.73	0.72	0.71
	M	0.43	0.43	0.45	0.44	0.46	0.41	0.41	0.40
Family tie	All	0.13	0.12	0.08	0.08	0.08	0.11	0.11	0.11
	F	0.40	0.35	0.20	0.18	0.14	0.17	0.12	0.12
	M	0.11	0.11	0.07	0.07	0.07	0.10	0.10	0.11
Number of positions	All	1.38	1.41	1.35	1.31	1.29	1.27	1.26	1.25
	F	1.40	1.41	1.29	1.21	1.17	1.20	1.16	1.20
	M	1.38	1.40	1.35	1.32	1.30	1.29	1.29	1.27
Retained	All	.	.	.	0.49	0.38	0.33	0.26	0.28
	F	.	.	.	0.63	0.59	0.58	0.57	0.60
	M	.	.	.	0.62	0.57	0.55	0.51	0.54
N	All	2048	2092	2158	2194	2276	2299	2426	2291
	F	116	119	137	160	207	284	432	474
	M	1932	1973	2021	2034	2069	2015	1994	1817
Panel B. Board of Auditors									
College degree	All	0.92	0.92	0.91	0.91	0.92	0.93	0.93	0.95
	F	0.88	0.90	0.86	0.88	0.85	0.90	0.92	0.94
	M	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.95
Graduate degree	All	0.02	0.01	0.02	0.03	0.03	0.03	0.03	0.03
	F	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04
	M	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
Studied abroad	All	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Table A1: Summary statistics, individual-level data

		2007	2008	2009	2010	2011	2012	2013	2014
	F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	M	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Economics degree	All	0.74	0.73	0.73	0.76	0.78	0.78	0.79	0.8
	F	0.75	0.69	0.73	0.77	0.76	0.78	0.78	0.80
	M	0.74	0.74	0.73	0.76	0.78	0.78	0.79	0.80
Law degree	All	0.07	0.07	0.07	0.07	0.08	0.07	0.08	0.07
	F	0.12	0.21	0.14	0.12	0.09	0.07	0.08	0.08
	M	0.07	0.06	0.06	0.07	0.08	0.07	0.07	0.07
Younger than 55	All	0.48	0.51	0.55	0.56	0.58	0.52	0.54	0.54
	F	0.73	0.70	0.66	0.70	0.74	0.74	0.77	0.76
	M	0.47	0.50	0.54	0.55	0.56	0.49	0.49	0.47
Family tie	All	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	F	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01
	M	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Number of positions	All	1.43	1.38	1.34	1.32	1.31	1.24	1.23	1.21
	F	1.08	1.07	1.08	1.09	1.11	1.15	1.21	1.22
	M	1.45	1.40	1.35	1.34	1.33	1.25	1.23	1.20
Retained	All	.	.	.	0.63	0.62	0.57	0.48	0.46
	F	.	.	.	0.50	0.50	0.37	0.22	0.20
	M	.	.	.	0.64	0.63	0.60	0.53	0.54
N	All	602	617	642	627	645	649	703	623
	F	26	30	38	43	46	72	128	148
	M	576	587	604	584	599	577	575	475

Notes: Averages of individual characteristics of Italian board members of listed companies, 2007-2014.

Table A2: Board of Auditors – Effect on board characteristics

Assumption on time trend:		Mean before quotas	No trend	R^2	N	Linear trend	R^2	N	Non-parametric	R^2	N
Percentage of women		7.24	23.93*** (1.50)	0.51	519	21.01*** (2.87)	0.51	519	23.73*** (1.53)	0.43	1633
More than 20% women		0.01	2.21** (1.10)		25	-18.73 (20879.27)		25	19.13 (9466.95)		84
Fem. President		0.02	4.10*** (1.02)		111	4.11* (2.36)		111	4.08** (2.03)		315
% college degree		88.30	5.56** (2.17)	0.06	519	-5.26 (4.11)	0.09	519	0.05 (2.31)	0.05	1633
	F	84.09	2.44 (3.32)	0.02	200	-6.71 (6.88)	0.06	200	1.70 (3.38)	0.06	496
	M	88.39	4.16* (2.38)	0.04	519	-6.57 (4.53)	0.07	519	-0.28 (2.45)	0.04	1633
% graduate degree		3.04	2.18*** (0.82)	0.03	519	0.33 (1.58)	0.03	519	1.25 (0.97)	0.01	1633
	F	0.00	6.71* (3.37)	0.08	200	3.36 (7.13)	0.08	200	6.67*** (2.40)	0.08	496
	M	3.20	1.59 (0.99)	0.01	519	-0.76 (1.90)	0.02	519	1.58 (1.14)	0.01	1633
% studied abroad		0.16	0.35 (0.32)	0.00	519	0.34 (0.62)	0.00	519	0.54 (0.42)	0.02	1633
	F	0.00	0.00 (.)	.	200	0.00 (.)	.	200	0.00 (.)	.	496
	M	0.16	-0.26 (0.18)	0.01	519	-0.50 (0.34)	0.01	519	0.25 (0.42)	0.04	1633
Filed diversity		0.88	0.02 (0.02)	0.01	510	-0.04 (0.04)	0.02	510	0.00 (0.02)	0.02	1606
% economics degree		78.12	7.97*** (2.35)	0.08	519	-5.88 (4.41)	0.12	519	1.76 (2.51)	0.07	1633
	F	75.00	-2.44 (3.32)	0.02	200	-10.74 (6.91)	0.06	200	-4.60 (3.44)	0.03	496
	M	78.12	5.40** (2.66)	0.04	519	-8.73* (5.03)	0.08	519	0.34 (2.76)	0.05	1633
% law degree		7.84	-0.55 (1.19)	0.00	519	-1.26 (2.30)	0.01	519	-0.87 (1.35)	0.01	1633
	F	9.09	0.00 (1.79)	0.08	200	-0.00 (3.79)	0.08	200	-0.10 (1.59)	0.18	496
	M	7.61	0.88 (1.47)	0.00	519	0.11 (2.84)	0.00	519	0.57 (1.56)	0.01	1633
% younger than 55		58.42	5.95**	0.05	519	-2.27	0.06	519	6.77**	0.08	1633

Continued on next page

56

Table A2: Board of Auditors – Effect on board characteristics

Assumption on time trend:		*Mean before quotas*	No trend	R^2	N	Linear trend	R^2	N	Non-parametric	R^2	N
			(2.64)			(5.05)			(3.14)		
	F	75.00	3.66	0.01	200	-18.79	0.06	200	-2.54	0.08	496
			(7.92)			(16.38)			(7.36)		
	M	56.81	-5.17*	0.05	519	-10.92*	0.05	519	-2.98	0.06	1633
			(3.01)			(5.79)			(3.49)		
% family ties		0.32	0.39	0.04	519	0.45	0.04	519	0.95	0.03	1633
			(0.77)			(1.48)			(0.81)		
	F	0.00	0.00	0.08	200	0.00	0.08	200	0.65	0.07	496
			(2.68)			(5.69)			(2.28)		
	M	0.48	0.29	0.02	519	0.33	0.02	519	0.74	0.02	1633
			(0.88)			(1.70)			(0.90)		
Number of positions		1.33	-0.05	0.05	519	0.17**	0.09	519	0.15***	0.10	1633
			(0.04)			(0.08)			(0.05)		
	F	1.06	0.18***	0.19	200	0.17	0.19	200	-0.07	0.10	496
			(0.05)			(0.11)			(0.07)		
	M	1.35	-0.03	0.03	518	0.19**	0.06	518	0.20***	0.09	1632
			(0.05)			(0.09)			(0.06)		

Notes: The table shows the coefficient on the reform indicator in a regression where the dependent variable is shown in the first column. In every regression, we control for the number of board members and the phase-in period. The three specifications for every regression correspond to different assumptions on the time trend. In the first two specifications ("No trend" and "Linear trend") observations are for election years over the period 2007-2014. In the third specification, we include observations over all years between 2007 and 2014, and add an election year fixed effect. The models with dependent variable *More than 20% women*, *Female CEO*, and *Female President* are estimated using a logit model, which explains the lower number of observations. The others are estimated using a linear model. Every regression controls for board fixed effects. Standard errors are clustered at the board level. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A3: The effect of women directors on economic performance and variability of stock market prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(empl.)	Log(prod.)	Log(profits)	Log(assets)	ROA	Tobin's Q	Short-term debt	Sd(stock prices)
Panel B – bis. ITT								
Reform	-0.124	-0.363	-0.100	0.004	0.000	-0.088	0.027	-0.002***
	(0.233)	(0.318)	(0.371)	(0.095)	(2.109)	(0.086)	(0.053)	(0.001)
Reform × Distance	0.023**	0.022*	-0.013	0.006	-0.065	0.006*	-0.001	0.004
	(0.009)	(0.012)	(0.016)	(0.004)	(0.083)	(0.003)	(0.002)	(0.004)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.423	0.345	0.086	0.186	0.032	0.087	0.257	0.175
Panel C – bis. IV								
Percentage of women	0.021**	0.013	-0.014	0.008**	-0.068	0.005	0.001	-0.008***
	(0.010)	(0.012)	(0.017)	(0.004)	(0.087)	(0.003)	(0.002)	(0.003)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.395	0.333	0.073	0.178	0.034	0.075	0.248	0.171
Mean of dep. var.	5.676	11.183	9.583	13.152	-0.674	0.847	0.613	0.021
N	874	782	566	892	899	875	776	7,446

Notes: Results of the regression of firm performance measures (yearly observations from 2011 to 2015, column 1 to 7) and monthly standard deviation of stock prices (monthly observations, column 8) on the lagged percentage of female directors (observations from 2010 to 2014). Panel B-bis shows the ITT specification, and Panel C-bis the IV regression. Year fixed effects are included for columns 1 to 7 and month fixed effects for column 8. We include dummies for the election years (months in column 8). The ITT specification in Panel B-bis also includes an indicator variable for the phase-in period. The first stage of the IV regression is reported in Table A4. Standard errors are clustered at the firm level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A4: IV regression in Table A3: first stage

	(1) Percentage of women
Reform	3.509***
	(0.973)
Reform × Distance from threshold	0.699***
	(0.054)
Phase-in	2.929***
	(1.136)
Year of election FE	Y
Firm FE	Y
Year FE	Y
Observations	1,047
Mean of dep. var.	13.381
F	178.46

Notes: First stage regression for the IV regression in Table A3. Yearly observations between 2010 and 2014. Standard errors are clustered at the firm level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A5: Daily average excess returns around the event date

	A. June 28, 2011			
	(1)	(2)	(3)	
	All firms	Above median distance	Below median distance	(2)-(3)
	-0.0011	-0.0016	-0.0002	-0.0014
	(0.0011)	(0.0014)	(0.0020)	(0.0024)
N. firms	222	103	100	203

	B. March 15, 2011			
	(1)	(2)	(3)	
	All firms	Above median distance	Below median distance	(2)-(3)
	0.0047***	0.0048***	0.0038***	0.0010
	(0.0010)	(0.0014)	(0.0014)	(0.0020)
N. firms	219	102	100	202

Notes: The table shows the estimated average abnormal returns over the three days surrounding the event for different portfolios of stocks. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$